OLP-10

Optical Power Meter

BN 2229/03, All Series

Service Manual

Wandel & Goltermann

Communications Test Solutions

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1 Introduction

1.1 General Notes

Before starting repairs, make sure that you are familiar with the safety measures described in Chapter 2.1.

Chapter 2 contains further, important information about measurement techniques and repair methods.

1.2 Measurement Equipment

Equipment	Troubleshooting + alignment Chapters 6 - 7	Function check Chapter 8
1 OMS-100 or OMS-200 Mainframe with OCD/OLS (850 ± 2 nm, -20 dBm) BN 2202/92.01 OCD/OLS (1310/1550 ± 2 nm, 0 dBm) BN 2202/92.06 OCD/OLP (special calibr. at -20 dBm) BN 2225/92.02 OLP-110 BN 2201/02 OLA-100 BN 2206/01	x	x
1 oscilloscope	x	
1 frequency counter	x	
1 digital multimeter	x	
2 singlemode cable, W&G type K31xx	x	x
1 multimode cable, W&G type K30xx	x	x

2 Important Notes

2.1 Safety Notes

Special safety notes for optical level meters

You should also read the notes in the Operating Manual.

> ***Caution!***
>
> The level meter can be operated with external laser or LED sources.The laser or LED beam is invisible to the human eye but may nevertheless cause permanent eye injuries.

Before operating the instrument familiarize yourself with the following safety notes and measures:

Safety notes and measures

- Always keep to the agreed source safety procedures.
- Do not turn on the source until all the optical fiber cables have been connected up properly.
- Only properly qualified technicians with the appropriate authorization may carry out repairs. They must be familiar with the relevant safety regulations and the associated risks.
- Areas must be designated as such and properly secured as stipulated by the relevant safety regulations (see Section "Warning Signs").
- When optical equipments are being operated, safety regulations to IEC 825, EN 60825 (Europe) and 21CFR1040.10 (Japan) must always be observed.

2.2 Anti-static Measures

Electrostatic charges and fields may damage or destroy semiconductor components.

It is, therefore, essential to protect all semiconductor components in the instrument from electrostatic charges and fields.

When the instrument is in its enclosure, there are no problems. When the instrument is opened, the DIN 40 021 warning symbol on

- boards and
- assemblies

that are sensitive to STATIC reminds you that special protective measures have to be taken



warning symbol according to DIN 40 021

Special measures

Grounded person	Only grounded persons using an anti-static workstation shall work on the instrument.
Grounded bracelet	A grounded bracelet is used to earth technicians working at anti-static workstations.

2.3.2 Test Techniques for SMD Boards

Never make direct connections (e.g. with a probe) to SMDs when you are checking them out. Instead, use tracks, test pads or vias.

If you are using a special probe with a sprung prod, only make contact at the foot of the component (see Figure 2-1).

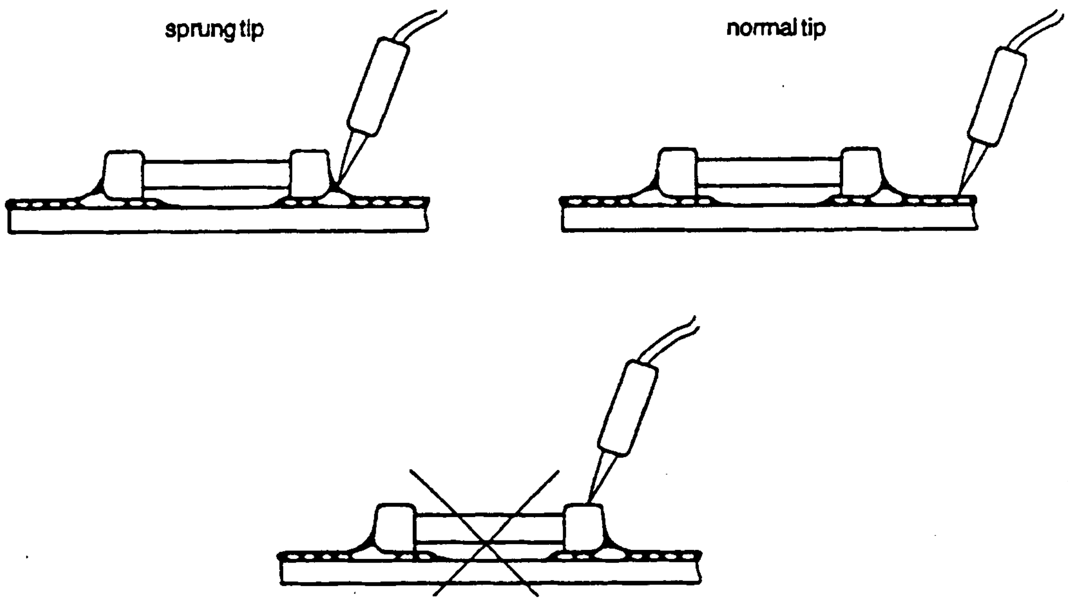


Fig. 2-1 Making measurements on SMD boards

2.3.3 SMD Handling Instructions

As incorrect handling of SMD components affects their characteristics, special care must be taken. For example, even minor contamination of the SMD pins, say a fingerprint, prevents effective wetting during soldering and so causes soldering defects. The separation between pins is often so small that traces of solder left by unsuitable tools can cause short circuits.

Always observe the following rules

- Only use special SMD tools and equipment.
- It is always best to use special SMD tweezers.
- Handle SMDs in the original condition (as delivered).
- Only use the original packaging to store and transport SMDs (component identification).
- Never touch SMDs with your bare fingers.
- Do not touch SMD pins (even with normal tools, for example tweezers, etc.). Special SMD test equipment, like test tweezers, etc. may however be used.
- SMDs that have been dropped must be thrown away (hairline cracks, especially with larger components).
- SMD identity check (measurement of R and C, etc.) should only be carried out using special SMD test tweezers if the components have not been inserted in a board.

Soldering SMDs into position

- SMDs without pins
  Use hot gas. The solder must be flowing on both pads simultaneously.
- SMDs with pins
  Use a miniature soldering iron or hot gas. Diagonally opposite IC pins must be soldered alternately.
- Check the joint with a magnifying glass (see Figure 2-3) for bridging, dry joints, cracks and holes, the soldering surface (smooth and evenly shiny), solder drops, splashes and the correct positioning of the SMD.

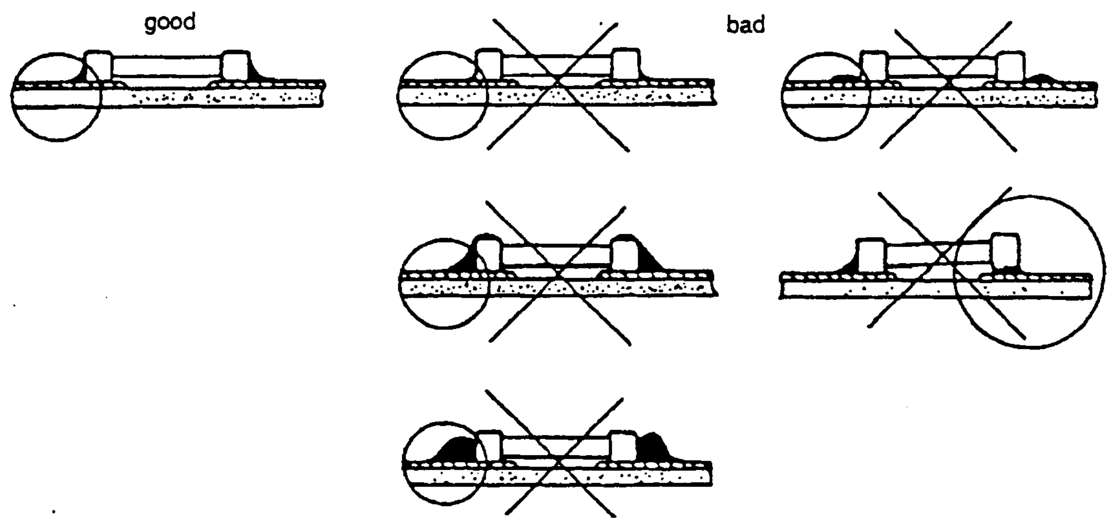


Fig. 2-3 Examples showing soldered SMDs

Repairing torn-off soldering pads

If a soldering pad for an SMD component with pins (IC, PLCC, SOT etc.) has been torn off, solder the component to the board following the usual guidelines and repair the defective pad in the following way:

A varnished wire (d = 0.2 mm) is connected from the component pin to a place of contact near the pad. It is best to use a via. If this is not possible, the wire can be soldered to a soldering pad (as large as possible) of an SMD component.

In the case of SMDs without pins (mini melf / melf resistors, diodes tantalum/multi-layer capacitors, chip resistors, C trimmers, etc.), measures must be taken to ensure the mechanical stability of the soldered joint if a soldering pad is missing.

1 Solder one side of the component to a soldering pad. Connect the other side to a via or an SMD soldering pad which should be as large as possible with a wire (d = 0.6 mm, if necessary insulated). The wire should not be longer than 10 mm.
2 If the method of repair described in 1. cannot be used, the component is held in place with an adhesive.
   - Dot the adhesive on the board.
   - Place component on board.
   - Cure adhesive (100 °C, 20 min).
   - Solder wire (varnished, 0.2 mm) to SMD pin and connect to suitable contact point.

If there is no suitable contact point near the repair, or it is essential to use connections of minimum length, any wide tracks can be used or the solder resist and the black oxide can be scratched from any convenient area and the wire soldered to it.

Recommended solder: wire solder, SnPb 63 d = 0.6 mm or d = 0.3 mm with FSW-32 flux.

3 Mechanical Design/Assembly Instructions

3.1 Instrument Codes

You will find the series number on the front panel.

3.2 Assembly Instructions

Disassembly

1 Remove black rubber ring <C>.
2 Remove the upper section <A> of the shockproof casing.
3 Remove battery compartment cover.
4 Remove the OLP from the lower section <B> of the shockproof casing.
5 Remove the 4 screws at the rear of the instrument (2 in the battery compartment).
6 Remove the upper section of the casing.

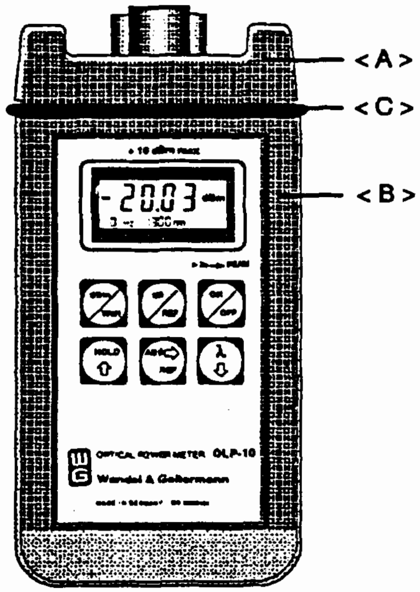


Fig. 3-1 Front view of the OLP

3.3 Software Upgrade

The software is stored in the EPROM U14.

4 Selftests

4.1 Overview

4.1.1 Power-On Test

After switch-on, the instrument carries out a power-on test (EEPROM test).
If a fault is detected, error message E3 is displayed.
Select the selftest for more checks.

4.1.2 Selftest Mode

The selftest comprises the RAM test, EPROM test and EEPROM test.

Calling the test

The instrument is off.

- Hold down the [HOLD] key.
- Turn on the instrument and hold down the [ON/OFF] key for > 1 s.
- Then release both keys.

Status indicator on the display

The course of the test is shown in the lambda field (wavelength field).
Any error message is also displayed in the lambda field.

Display	Function	Duration	Error message
2	RAM-test	3 s	E1
1	EPROM-test	6 s	E2
1	EEPROM-test	0.1 s	E3

Table 4-1

Test status at port 5.7

If the display is defective or the fault symptoms are inconclusive, the test status can also be measured at port 5.7 on the microprocessor (U10 pin 60).

- The default value for port 5.7 is HIGH.
- When the test is started, the port is LOW.
- If the test is ok, port 5.7 goes HIGH.
- If the test finds a fault, the port stays LOW.

See Chapter 6 "Fault Localization, Component Level" for further fault localization.

5 Omitted

6 Fault Localization, Component Level

6.1 Voltage Supply

Nominal battery voltage (point H02 to H03): 2.2 V to 3.5 V

6.2 On/Off Control

Switching the instrument on

Turn on the instrument by pressing the ON/OFF key.

Point H03:	approx. -0.2 V (Q1 and then U1.2 are turned on)
U11 pin 12:	Delayed high after low (RESET)
Signal CPFF_IN/U11 pin 11:	High
Signal INT2/U11 pin 20:	High

Permanent operation

Press the ON/OFF key for >2 s at power-on.

Signal PERM_IN/U11 pin 10: <1 V after approx. 2 s.

Switching off the instrument

Turn off the instrument by pressing the ON/OFF key.

Signal CPFF_IN/U11 pin 11:	Low pulses (Q2 on)
Signal INT2/U11 pin 20:	Low after high

Reference point: Ground connection of C2 (analog ground)

6.3 +5 V Power Supply and -5 V Power Supply

Measure the supply voltages. Reference point: Ground connection of C2 (analog ground).

U2 pin 5:	+5.00 V ± 250 mV
U3 pin 5:	-4.90 V ± 250 mV

6.4 Reference Voltage Generation (U7)

Check the reference voltage for the A/D converter. Reference point: Ground connection of C2 (analog ground).

U7 pin 6: +2.50 V ± 10 mV

U7 also supplies a voltage VTEMP (at U7 pin 3) which is proportional to temperature.
At 25 °C: VTEMP = 690 mV; TC = +2.3 mV/K (all approximate values).

6.5 Battery Monitor (U6.2)

The LOW_BAT signal (U6.2 pin 5) goes from high to low if the voltage VBAT goes below 2.2 V.

-3 dBm input level at 1310 nm

Input circuit range 1 active.

Signal at U5.1 pin 1/U8 pin 14:	35 to 50 mV

-15 dBm input level at 1310 nm

Input circuit range 2 active.

Signal at U5.1 pin 1/U8 pin 14:	300 to 450 mV

-40 dBm input level at 1310 nm

Input circuit range 3 active.

Signal at U5.1 pin 5/U8 pin 14:	150 to 220 mV

6.10 ADC

Carry out checks with a digital multimeter and frequency counter.

U8 pin 5:	32.768 kHz (clock)
U8 pin 18:	1.28 V ± 15 mV
U8 pin 13:	-4.5 to -5.5 V
U8 pin 24:	4.5 to 5.5 V

6.11 Frequency Detection/Frequency Measurement

Use the test setup described in Chapter 6.9, but: FMOD = 1000 Hz

Signal at U6.1 pin 7:	1000 Hz (FMOD)
F/IN signal at U16.1 pin 1:	500 Hz (FMOD/2)

7 Alignment Instructions

7.1 General Notes

The following data are stored in EEPROM U13:

- Linearity corrections for 1310 nm
- Absolute level corrections for 850 nm, 1310 nm and 1550 nm
- Temperature alignment data

So that these alignments can be carried out when the instrument is serviced, instruments from series C have a special integral alignment routine which makes it possible to record and store the alignment values. This software can be retrofitted to series A and B instruments (EPROM U14).

7.2 Required Equipment

1 OMS-100 or OMS-200 Mainframe
1 OCD/OLS (850 ± 2 nm, -20 dBm) BN 2202/92.01
1 OCD/OLS (1310/1550 ± 2 nm, 0 dBm) BN 2202/92.06
1 OCD/OLP (special calibrated at -20 dBm) BN 2225/92.02
1 OLP-110 BN 2201/02
1 OLA-100 BN 2206/01
2 singlemode cable K31xx
1 multimode cable K30xx

7.3 Accuracy

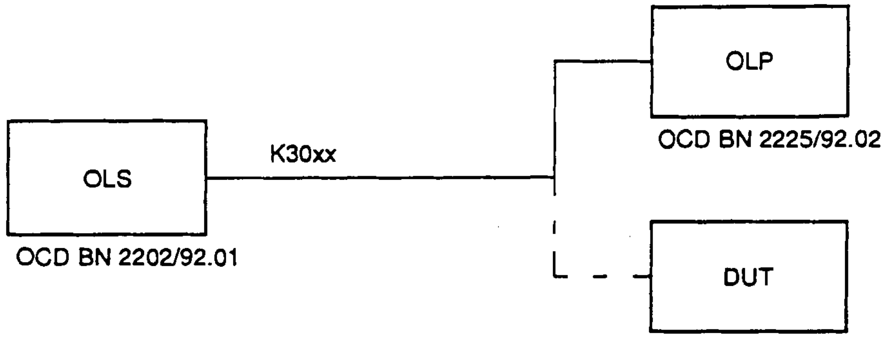
Wavelength dependence

The technical data of the OLP-10/15 are strongly wavelength-dependent. Therefore, sources with selected wavelenths are required to carry out alignments. If the wavelengths of the sources differ from the nominal wavelengths, the measurement error of the OLP-10/-15 may increase.

7.4 Preparations

- Ambient Conditions: Moderate lab conditions, 23 °C ± 3 °C.
- Before carrying out the function test, the optical connectors must be carefully cleaned and inspected.

Test setup 3, for alignment at -20 dBm / 850 nm



Instrument settings

OLS:	Lambda = 850 nm, level = -20 dBm, FMOD = CW
OLP:	ABS, Lambda coupled to OLS, DISPL = x.xx
DUT:	Alignment routine

7.6 Calling the Alignment Routine

- Open the instrument.
- Set DIP switch S1.2 to ON.
- Close the instrument again (no stray light must enter instrument)
- Turn on by pressing the PERM key (press ON/OFF key for >2 s)
- Let the instrument warm up for 5 minutes.

When the instrument is turned on, it counts down from 10 to 1 (displayed in the lambda field) and then goes into the standard settings for the first alignment step:

Level:	-2.00 dBm
Lambda:	1310 nm
Status:	1_0 (in modulation field)

7.7 Function of the Keys

dBm/Watt	Steps 1 - 8: Starts an alignment procedure and buffers results. Step 9: Stores value in EEPROM
dB/REF	Selects the next alignment step
<–	Select level digit
↑	Selected level digit plus 1
↓	Selected level digit minus 1
ON/OFF	Quits the alignment routine

Step 8: Temperature alignment

Step 8 is used to enter the reference temperature. The current temperature in °C must be entered with an accuracy of ± 3 °C.

- Enter the current ambient temperature in °C by using the blue STEP keys.
- Press the [dBm/Watt] key. Value is buffered in RAM
- Press the [dB/REF] key, go on to next step.

Step 9: Storage

Step 9 is used to store the data that have been recorded in EEPROM.

- When step 9 is reached, "-S-" is displayed.
- Each alignment step can be repeated by pressing the appropriate blue STEP key.
- To quit the alignment routine **without storing** the alignment values, press the ON/OFF key.
- When the [dBm/Watt] key is pressed, the alignment data recorded from steps 1 to 8 are transferred to the EEPROM.

Status messages in the modulation field

9--:	Memory routine running.
9_1:	Successful alignment, EEPROM has been overwritten.
9_E:	Alignment not possible or only partial alignment carried out.

Error messages in the lambda field (if 9_E appears)

E10:	No alignment step has been carried out successfully. -> No storage possible.
E11:	Only some alignments have been carried out. -> Storage of some alignments possible (see below)
E12:	Linearity alignment was incorrect or incomplete. -> No storage possible.
E14:	Linearity alignment out-of-tolerance.
E15:	Absolute level alignment at 850 nm out-of-tolerance.
E16:	Absolute level alignment at 1310 nm out-of-tolerance.
E17:	Absolute level alignment at 1550 nm out-of-tolerance.
E18:	Temperature alignment out-of-tolerance.

Note on E11 (partial alignment)

The alignment blocks "linearity of alignment", "absolute alignment" and "temperature alignment" do not all have to be carried out. One or more blocks may be run provided each block is run correctly.

- Press the [dBm/Watt] key again.

If the status message 9_E appears again, there is an alignment error. Repeat the affected alignment steps.

8 Function Check/Confidence Test

8.1 Introduction

The technical data of the OLP-10/15 are strongly wavelength-dependent. If the wavelengths of the sources differ from the nominal wavelengths, the measurement error of the OLP-10/-15 may increase.

The function check/confidence test is performed at the wavelengths of 1320 nm, 1550 nm and 850 nm.

8.2 Preparations

- Ambient conditions: Moderate lab environment, 23 °C ± 3 °C, no direct illumination (e.g sunlight).
- Carefully clean and check the optical connectors.
- Perform the dark current adjustment (dust cap on the measurement port, then press and hold down the dBm/Watt key. For more information see the operating manual).

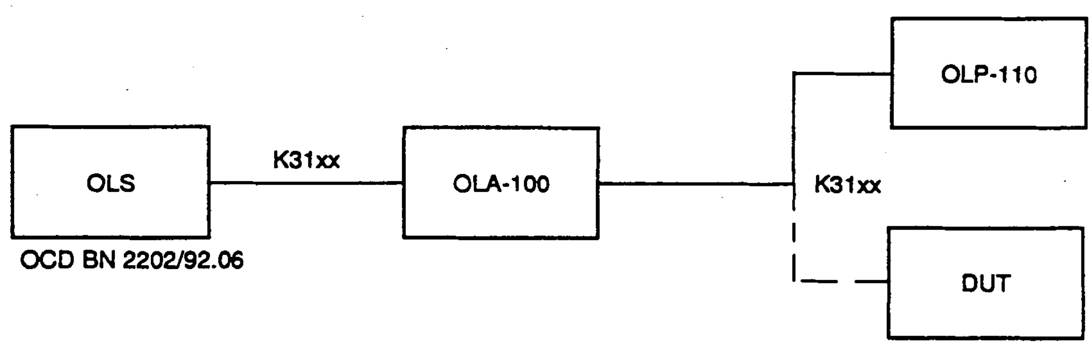
Important: The data determined during dark current adjustment is stored in volatile memory. After switching off and then on again the dark current adjustment must be repeated.

8.3 Measurement Errors at 1310 nm

The check is carried out at 1310 nm ± 2 nm.

Note: The reference measurements using the OLP-110 are only valid if the wavelengths of the OLS and the OLP-110 are coupled (automatic correction of the wavelength dependency for the reference measurement).

Test setup



Settings

OLS:	Lambda = 1310 nm, level = 0 dBm, FMOD = CW
OLA-100:	Lambda coupled to OLS, see below for attenuation
OLP-110:	ABS, STD, Lambda coupled to OLS FMOD = CW, BW = 2 Hz, AUTORANGE ON, DISPL = x.xx

Settings

OLS: Lambda = 1550 nm, level = 0 dBm, FMOD = CW

OLA-100: Lambda coupled to OLS, see below for attenuation

OLP-110: ABS, STD, Lambda coupled to OLS
FMOD = CW, BW = 2 Hz, AUTORANGE ON,
DISPL = x.xx

DUT: Lambda = 1550 nm

Measurement

- Carry out the reference measurement with the OLP-110 at 1550 nm and -3 dBm. Set the OLS and the OLA so that the OLP-110 indicates -3.00 dBm.
- Carry out measurement with the DUT.
- Repeat the measurements at -30 dBm and -50 dBm. For function check limits see table below.

OLP-10:

Level	Specified limits	Uncertainty of measurement	Function check limits
-3 dBm	± 0.70 dB	± 0.20 dB	± 0.90 dB
-30 dBm	± 0.70 dB	± 0.20 dB	± 0.90 dB
-50 dBm	± 0.88 dB	± 0.20 dB	± 1.08 dB

OLP-15:

Level	Specified limits	Uncertainty of measurement	Function check limits
-3 dBm	± 0.22 dB	± 0.20 dB	± 0.42 dB
-30 dBm	± 0.22 dB	± 0.20 dB	± 0.42 dB
-50 dBm	± 0.22 dB	± 0.20 dB	± 0.42 dB

8.5 Measurement Error at 850 nm

The check is carried out at 850 nm ± 2 nm.

Note: The reference measurement using the OLP-110 is only valid if the wavelengths of the OLS and the OLP-110 are coupled (automatic correction of the wavelength dependency for the reference measurement).

Settings

OLS:	Lambda = 1310 nm, level = 0 dBm, FMOD = CW
OLA-100:	Lambda coupled to OLS, see below for attenuation
DUT:	Lambda = 1310 nm

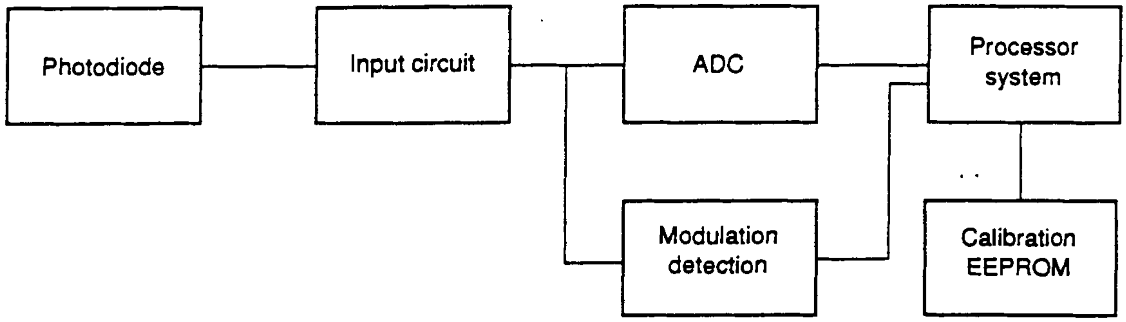
Measurement

- Set the OLA so that the DUT indicates -20 dBm (approx.).
- Switch on the OLS frequency modulation with FMOD = 270 Hz, 1 kHz and 2 kHz one after the other.
  The DUT should display the frequencies.
- Repeat the check at -47 dBm CW.

Note: With modulated light the displayed level is 3 dB lower than in CW.

9 Circuit Description

Block diagram



Photodiode

A germanium photodiode is used in the OLP-10. The Ge diode is ideal for the wavelengths 820/850 nm and 1300/1310 nm. The measurement error increases at 1550 nm.

An InGaAs-photodiode is used for the OLP-15. The InGaAs diode is ideal for the wavelengths 1300/1310 nm and 1550 nm. The measurement error increases at 850 nm.

Input circuit

After the photodiode comes a three-stage transimpedance amplifier which converts the photodiode current into a voltage.
The stages (ranges 1 to 3) are driven via U5.2.
The most sensitive stage (range 3) comprises U4.1 and R13. Q5 is connected to the relatively high-impedance output of U4.1 and acts as an impedance converter. In range 3, Q7 is on, but Q3 and Q6 are off.
The middle stage (range 2) is formed by U4.2 plus Q4 and R9. Q6 is on but Q3 and Q7 are off.
In the highest stage (range 1), R8 is connected in parallel with R9 (middle stage).
Therefore, in range 1, Q3 and Q6 are on, Q7 is off.

The following are selected via multiplexer U5.1:

Pin 1:	Range 1 or 2
Pin 5:	Range 3
Pin 2:	Ground
Pin 3:	Temperature voltage (generated by U7)

The multiplexer output feeds the signal via a lowpass (R18, C11) to the A/D converter U8. This is an integrating ADC (integration capacitor C15) with serial output. Its drive range (pin 14) is 0 V to 1 V.

On/off control

The "main switch" of the instrument is U1.2. Q1 is an auxiliary on-switch.

When the ON/OFF key is pressed, Q1 is turned on, the DC/DC converter U2 receives current and starts, the 5 V voltage supply builds up and the gate array U11 and microcontroller U10 receive a reset. When a reset is detected, the gate array causes line INT2 (U11 PIN 20) to go high, turning on Q10 and Q9 and so also turning on U1.2. The instrument is now switched on.

If the ON/OFF key is held down, capacitor C3 charges via R7 and Q2. From a certain level (ON/OFF pressed > approx. 2 seconds), the gate array detects PERM_IN low at its input (U11 pin 10) and the instrument goes into permanent mode. This means: the PERM LED is turned on and the instrument's power cut-off facility disabled.

If the PERM_IN input remains high (ON/OFF < approx. 2 s), the instrument will turn itself off automatically after 20 minutes to save the batteries.

Turning off the instrument: If the ON/OFF key is pressed, the gate array receives a pulse via Q2 and C4 at input CPFF (U11 pin 11). The INT2 line goes LOW, Q10 turns off after a delay (provided by C21), so turning off Q9 and U1.2 too. The delay gives the microcontroller time to store the current device settings in EEPROM before the instrument turns off.

Battery monitoring

Comparator U6.2 is used for battery monitoring. The LOW_BAT signal (pin 5) goes low if the battery voltage goes below 2.2 V. BAT is displayed as a warning.

+5 V power supply

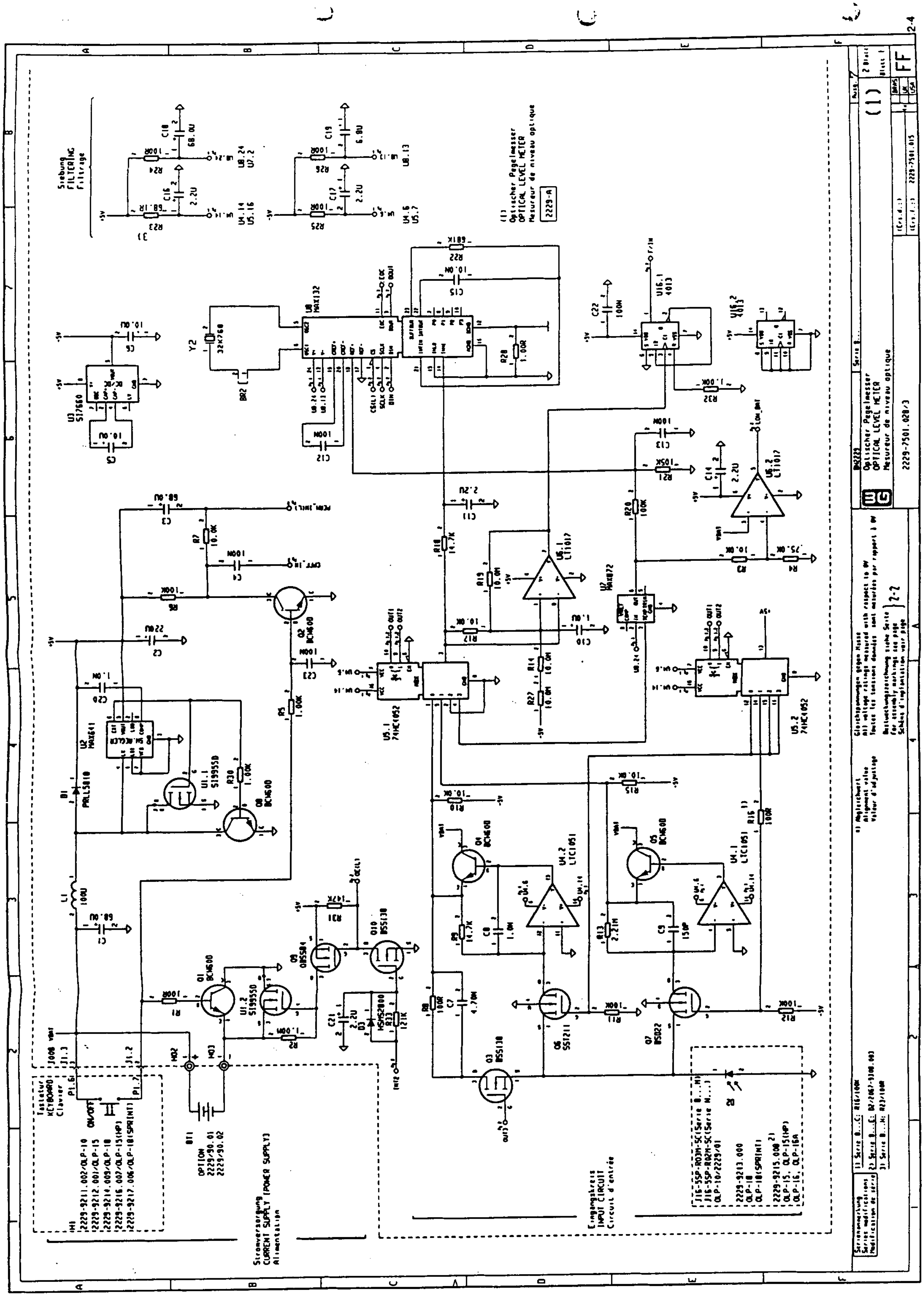
The DC/DC converter U2 goes into operation if the battery voltage goes above approx. 2 V and is designed to operate up to about 3.5 V. Q8 and U1.1 help the DC/DC converter to start.

-5 V power supply

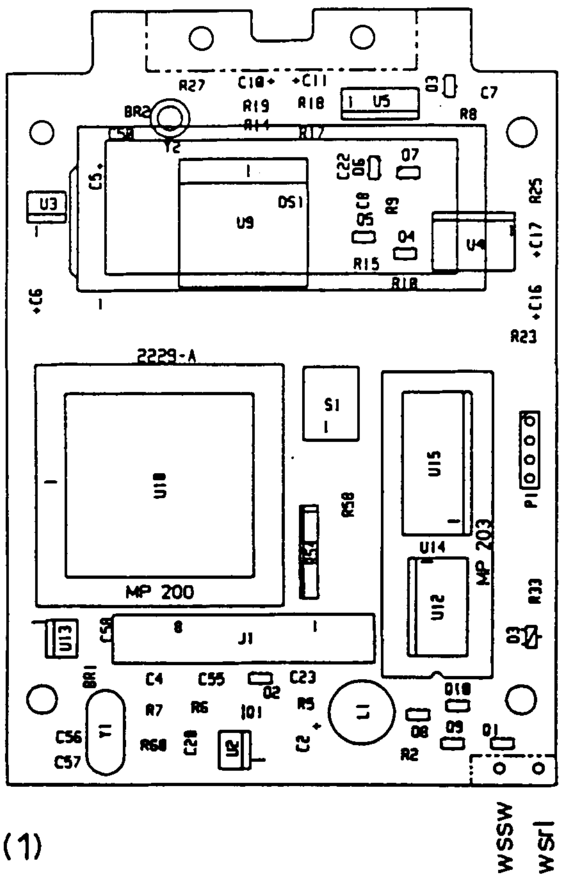
The DC/DC converter U3 generates the -5 V supply from the +5 V supply.

Calibration EEPROM

All alignments are carried out using corrections which are stored in EEPROM U13.

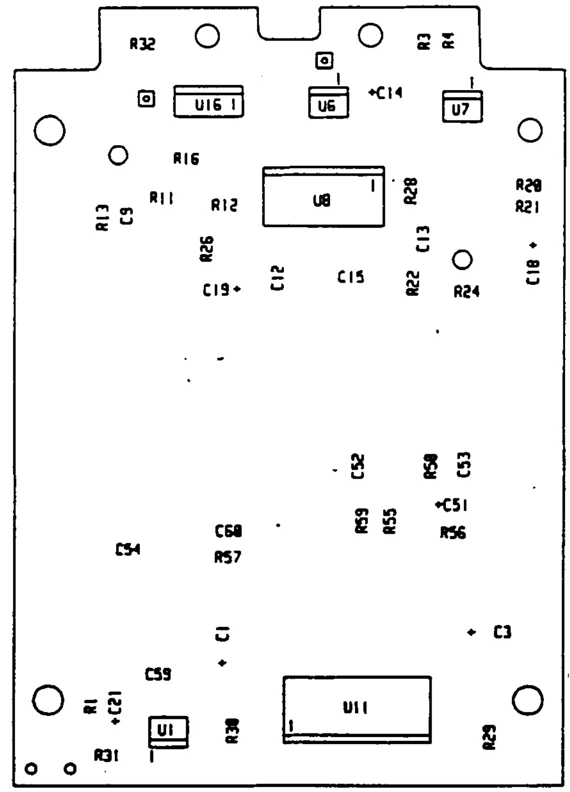

Siebung
FILTERING
Filtrage
Optischer Pegelmesser
OPTICAL LEVEL METER
Mesureur de niveau optique
2229-A
2229-7501.028/3
Stromversorgung
CURRENT SUPPLY (POWER SUPPLY)
Alimentation
Eingangskreis
INPUT CIRCUIT
Circuit d'entrée

Ansicht L1



(1)

Ansicht L6



Benennung DESIGNATION

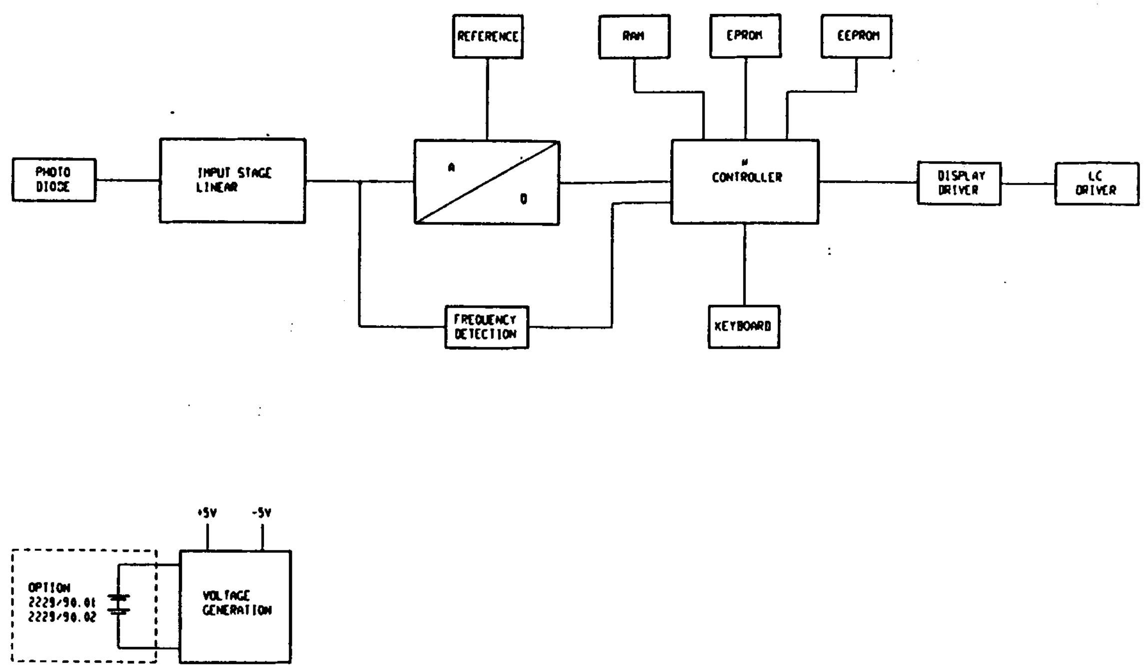
OLP-10

OLP-10

4

Sachnummer PART No.	Format SIZE
2229-7000.008	4

LP-Index 2229-A	CAD



Serienanmerkung
Series modifications
Modification de série

1) Serie

*) Abgleichwert
Alignment value
Valeur d'adjustage

Gleichspannungen gegen Masse
All voltage ratings measured with respect to 0V
Toutes les tensions données sont mesurées par rapport à 0V

Bestueckungszeichnung siehe Seite
For assembly markings see page
Schéma d'implantation voir page

BN 2229 | Serie A... | Ausg.

Blockschaltplan
BLOCK DIAGRAM
Schéma synoptique

(0) 1 Blatt Blatt 1

2229-7500.0:S/1

FF

OLP-10, SERIES W ...					
PLATINE	LP-INDEX	TEILNR	SACHNUMMER	BENENNUNG	BEZEICHNUNG-1
PC-BOARD	MARKING	ITEM-NO	PART-NUMBER	DESCRIPTION	MARKING
BOARD-OVERVIEW			2229-7003.005	OLP-10	2229-D
ITEMS OUT OF BOARD		1D2	0001-0249.149	DIODE GE FOTO-	J16-5SP-R02M-SC TO 5
ITEMS OUT OF BOARD		1H1	2229-9221.005	TASTATUR FOLIEN-	FUER OLP-10/NAVY
ITEMS OUT OF BOARD		1J2	0001-0242.081	BUCHSE KLINKEN-+FED.	2 M LP LT
ITEMS OUT OF BOARD		1U14	2229-9313.007	IC-MOS	27C1001-15 DIC 32
2229-7003.005	2229-D	1C1	0000-7683.721	ELKO-TA SINT CHIP	68U 20% 6V3
2229-7003.005	2229-D	1C2	0000-7672.677	ELKO-AL	220U 20/ 50 16V
2229-7003.005	2229-D	1C3	0000-7683.721	ELKO-TA SINT CHIP	68U 20% 6V3
2229-7003.005	2229-D	1C4	0000-7646.535	C-KERAMIK KBFQ	100N 10% 50V
2229-7003.005	2229-D	1C5	0000-7682.722	ELKO-TA SINT CHIP	10U 20% 16V
2229-7003.005	2229-D	1C6	0000-7682.722	ELKO-TA SINT CHIP	10U 20% 16V
2229-7003.005	2229-D	1C7	0000-7660.906	C-KERAMIK KBFQ	4N7 10% 50V
2229-7003.005	2229-D	1C8	0000-7699.993	C-KERAMIK KBFQ	1N 2% 50V
2229-7003.005	2229-D	1C9	0000-7614.800	C-KERAMIK KBFQ	150P 2% 50V
2229-7003.005	2229-D	1C10	0000-7681.202	ELKO-TA SINT CHIP	1U0 20% 16V
2229-7003.005	2229-D	1C11	0000-7681.163	ELKO-TA SINT CHIP	2U2 20% 6V3
2229-7003.005	2229-D	1C12	0000-7646.535	C-KERAMIK KBFQ	100N 10% 50V
2229-7003.005	2229-D	1C13	0000-7646.535	C-KERAMIK KBFQ	100N 10% 50V
2229-7003.005	2229-D	1C14	0000-7681.163	ELKO-TA SINT CHIP	2U2 20% 6V3
2229-7003.005	2229-D	1C15	0000-7651.012	C-KERAMIK KBFQ	10N 1% 50V
2229-7003.005	2229-D	1C16	0000-7681.163	ELKO-TA SINT CHIP	2U2 20% 6V3
2229-7003.005	2229-D	1C17	0000-7681.163	ELKO-TA SINT CHIP	2U2 20% 6V3
2229-7003.005	2229-D	1C18	0000-7683.721	ELKO-TA SINT CHIP	68U 20% 6V3
2229-7003.005	2229-D	1C19	0000-7681.176	ELKO-TA SINT CHIP	6U8 20% 6V3
2229-7003.005	2229-D	1C20	0000-7699.993	C-KERAMIK KBFQ	1N 2% 50V
2229-7003.005	2229-D	1C21	0000-7681.163	ELKO-TA SINT CHIP	2U2 20% 6V3
2229-7003.005	2229-D	1C22	0000-7646.535	C-KERAMIK KBFQ	100N 10% 50V
2229-7003.005	2229-D	1C23	0000-7646.535	C-KERAMIK KBFQ	100N 10% 50V
2229-7003.005	2229-D	1C24	0000-7699.993	C-KERAMIK KBFQ	1N 2% 50V
2229-7003.005	2229-D	1C25	0001-0249.673	C-KERAMIK KBFQ	220N 10% 50V
2229-7003.005	2229-D	1C26	0000-7699.993	C-KERAMIK KBFQ	1N 2% 50V
2229-7003.005	2229-D	1C27	0001-0249.673	C-KERAMIK KBFQ	220N 10% 50V
2229-7003.005	2229-D	1C28	0000-7646.535	C-KERAMIK KBFQ	100N 10% 50V
2229-7003.005	2229-D	1C29	0001-0249.673	C-KERAMIK KBFQ	220N 10% 50V
2229-7003.005	2229-D	1C30	0000-7646.535	C-KERAMIK KBFQ	100N 10% 50V
2229-7003.005	2229-D	1C50	0000-7646.535	C-KERAMIK KBFQ	100N 10% 50V
2229-7003.005	2229-D	1C51	0000-7681.163	ELKO-TA SINT CHIP	2U2 20% 6V3
2229-7003.005	2229-D	1C52	0000-7646.535	C-KERAMIK KBFQ	100N 10% 50V
2229-7003.005	2229-D	1C53	0000-7646.535	C-KERAMIK KBFQ	100N 10% 50V
2229-7003.005	2229-D	1C54	0000-7646.535	C-KERAMIK KBFQ	100N 10% 50V
2229-7003.005	2229-D	1C55	0000-7646.535	C-KERAMIK KBFQ	100N 10% 50V
2229-7003.005	2229-D	1C56	0000-7610.969	C-KERAMIK KBFQ	68P 2% 50V
2229-7003.005	2229-D	1C57	0000-7614.800	C-KERAMIK KBFQ	150P 2% 50V
2229-7003.005	2229-D	1C58	0000-7646.535	C-KERAMIK KBFQ	100N 10% 50V
2229-7003.005	2229-D	1C59	0000-7646.535	C-KERAMIK KBFQ	100N 10% 50V
2229-7003.005	2229-D	1C60	0000-7646.535	C-KERAMIK KBFQ	100N 10% 50V
2229-7003.005	2229-D	1D1	0001-0236.822	DIODE SI SCHOTTKY-	PRLL5818 S-MELF
2229-7003.005	2229-D	1D3	0000-7672.499	DIODE SI SCHOTTKY-	HSMS-2800-L A0 SOT 23

OLP-10, SERIES W ...					
PLATINE	LP-INDEX	TEILNR	SACHNUMMER	BENENNUNG	BEZEICHNUNG-1
PC-BOARD	MARKING	ITEM-NO	PART-NUMBER	DESCRIPTION	MARKING
2229-7003.005	2229-D	1D4	0000-7655.924	DIODE SI SCHOTTKY-	LL103A M-MELF
2229-7003.005	2229-D	1D5	0000-7655.924	DIODE SI SCHOTTKY-	LL103A M-MELF
2229-7003.005	2229-D	1D6	0000-7655.924	DIODE SI SCHOTTKY-	LL103A M-MELF
2229-7003.005	2229-D	1DS1	2229-9220.006	ANZEIGE 7-SEGM. LCD	BV2229-9220.006 SIL 33
2229-7003.005	2229-D	1J1	0001-0237.148	LEISTE FEDER-	8 1 2,54 S1 SN
2229-7003.005	2229-D	1L1	0001-0236.990	SPULE FEST	100U 10% 262LYF-0092K
2229-7003.005	2229-D	1MP1	2229-7000.587	OLP-10	06HN4E91FD
2229-7003.005	2229-D	1MP200	0000-7646.276	FASSUNG IC-	PLC 68 SNPB
2229-7003.005	2229-D	1MP201	0000-7547.281	UNTERLAGE	TO 18 PA
2229-7003.005	2229-D	1MP203	0000-7678.037	FASSUNG IC-	DIL 32 AU0,4/NI1,3
2229-7003.005	2229-D	1MP204	0000-3706.903	QUARZUNTERLAGE	FUER HC-18/U & LF-08
2229-7003.005	2229-D	1MP300	0001-0255.418	HINTERLEUCHTG. LCD-	52X 23X1,3 KOMPL.
2229-7003.005	2229-D	1MP500	2229-0000.102	ABSTANDSHALTER	
2229-7003.005	2229-D	1MP501	2229-0000.102	ABSTANDSHALTER	
2229-7003.005	2229-D	1MP502	0000-7668.393	KLEBEBAND	SCOTCH 12
2229-7003.005	2229-D	1MP503	0000-7668.393	KLEBEBAND	SCOTCH 12
2229-7003.005	2229-D	1P1	0000-7570.999	LEISTE STIFT- MOD II	4 1 2,54 S1 AU
2229-7003.005	2229-D	1Q1	0000-7639.034	TRANS SI NPN	BCW60D AD A SOT 23
2229-7003.005	2229-D	1Q2	0000-7639.034	TRANS SI NPN	BCW60D AD A SOT 23
2229-7003.005	2229-D	1Q3	0000-7700.400	TRANS SI N DMOS	BSS138 SS B SOT 23
2229-7003.005	2229-D	1Q4	0000-7639.034	TRANS SI NPN	BCW60D AD A SOT 23
2229-7003.005	2229-D	1Q5	0000-7639.034	TRANS SI NPN	BCW60D AD A SOT 23
2229-7003.005	2229-D	1Q6	0001-0237.122	TRANS SI N DMOS	SST211 D1** SOT143
2229-7003.005	2229-D	1Q7	0001-0236.819	TRANS SI N MOS	BSD22 M32 SOT143
2229-7003.005	2229-D	1Q8	0000-7639.034	TRANS SI NPN	BCW60D AD A SOT 23
2229-7003.005	2229-D	1Q9	0000-7668.322	TRANS SI P VMOS	BSS84 SP B SOT 23
2229-7003.005	2229-D	1Q10	0000-7700.400	TRANS SI N DMOS	BSS138 SS B SOT 23
2229-7003.005	2229-D	1Q11	0000-7668.322	TRANS SI P VMOS	BSS84 SP B SOT 23
2229-7003.005	2229-D	1Q12	0000-7639.034	TRANS SI NPN	BCW60D AD A SOT 23
2229-7003.005	2229-D	1R1	0000-7650.893	R-METALL-MMELF HF-	100R 1% 0204
2229-7003.005	2229-D	1R2	0000-7654.475	R-METALL-MMELF	1M 1% 0204
2229-7003.005	2229-D	1R3	0000-7647.262	R-METALL-MMELF	10K 1% 0204
2229-7003.005	2229-D	1R4	0000-7651.779	R-METALL-MMELF	75K 1% 0204
2229-7003.005	2229-D	1R5	0000-7646.946	R-METALL-MMELF	1K 1% 0204
2229-7003.005	2229-D	1R6	0000-7647.411	R-METALL-MMELF	100K 1% 0204
2229-7003.005	2229-D	1R7	0000-7647.262	R-METALL-MMELF	10K 1% 0204
2229-7003.005	2229-D	1R8	0000-7650.893	R-METALL-MMELF HF-	100R 1% 0204
2229-7003.005	2229-D	1R9	0000-7681.082	R-METALL-MMELF	14K7 1% 0204
2229-7003.005	2229-D	1R10	0000-7647.262	R-METALL-MMELF	10K 1% 0204
2229-7003.005	2229-D	1R11	0000-7647.411	R-METALL-MMELF	100K 1% 0204
2229-7003.005	2229-D	1R12	0000-7647.411	R-METALL-MMELF	100K 1% 0204
2229-7003.005	2229-D	1R13	0000-7667.718	R-METALL-MMELF	2M21 1% 0204
2229-7003.005	2229-D	1R14	0000-7702.521	R-METALL-MMELF	10M 1% 0204
2229-7003.005	2229-D	1R15	0000-7647.262	R-METALL-MMELF	10K 1% 0204
2229-7003.005	2229-D	1R16	0000-7650.893	R-METALL-MMELF HF-	100R 1% 0204
2229-7003.005	2229-D	1R17	0000-7647.262	R-METALL-MMELF	10K 1% 0204
2229-7003.005	2229-D	1R18	0000-7681.082	R-METALL-MMELF	14K7 1% 0204
2229-7003.005	2229-D	1R19	0000-7702.521	R-METALL-MMELF	10M 1% 0204

OLP-10, SERIES W ...					
PLATINE	LP-INDEX	TEILNR	SACHNUMMER	BENENNUNG	BEZEICHNUNG-1
PC-BOARD	MARKING	ITEM-NO	PART-NUMBER	DESCRIPTION	MARKING
2229-7003.005	2229-D	1R20	0000-7647.411	R-METALL-MMELF	100K 1% 0204
2229-7003.005	2229-D	1R21	0000-7665.943	R-METALL-MMELF	105K 1% 0204
2229-7003.005	2229-D	1R22	0000-7663.026	R-METALL-MMELF	681K 1% 0204
2229-7003.005	2229-D	1R23	0000-7655.597	R-METALL-MMELF HF-	68R1 1% 0204
2229-7003.005	2229-D	1R24	0000-7650.893	R-METALL-MMELF HF-	100R 1% 0204
2229-7003.005	2229-D	1R25	0000-7650.893	R-METALL-MMELF HF-	100R 1% 0204
2229-7003.005	2229-D	1R26	0000-7650.893	R-METALL-MMELF HF-	100R 1% 0204
2229-7003.005	2229-D	1R27	0000-7702.521	R-METALL-MMELF	10M 1% 0204
2229-7003.005	2229-D	1R28	0000-7646.920	R-METALL-MMELF	1R 1% 0204
2229-7003.005	2229-D	1R29	0000-7654.475	R-METALL-MMELF	1M 1% 0204
2229-7003.005	2229-D	1R30	0000-7646.946	R-METALL-MMELF	1K 1% 0204
2229-7003.005	2229-D	1R31	0000-7681.121	R-METALL-MMELF	147K 1% 0204
2229-7003.005	2229-D	1R32	0000-7646.946	R-METALL-MMELF	1K 1% 0204
2229-7003.005	2229-D	1R33	0000-7647.479	R-METALL-MMELF	121K 1% 0204
2229-7003.005	2229-D	1R34	0000-7650.893	R-METALL-MMELF HF-	100R 1% 0204
2229-7003.005	2229-D	1R35	0001-0202.762	R-METALL-MMELF HF-	19R6 1% 0204
2229-7003.005	2229-D	1R36	0000-7663.738	R-METALL-MMELF	ABGLEICHW. 1% 0204
2229-7003.005	2229-D	1R37	0000-7663.738	R-METALL-MMELF	ABGLEICHW. 1% 0204
2229-7003.005	2229-D	1R38	0000-7663.738	R-METALL-MMELF	ABGLEICHW. 1% 0204
2229-7003.005	2229-D	1R39	0000-7646.797	R-METALL-MMELF	750R 1% 0204
2229-7003.005	2229-D	1R40	0000-7646.946	R-METALL-MMELF	1K 1% 0204
2229-7003.005	2229-D	1R41	0000-7646.946	R-METALL-MMELF	1K 1% 0204
2229-7003.005	2229-D	1R42	0000-7647.262	R-METALL-MMELF	10K 1% 0204
2229-7003.005	2229-D	1R43	0000-7647.440	R-METALL-MMELF	215K 1% 0204
2229-7003.005	2229-D	1R50	0000-7665.875	R-METALL-MMELF	51K1 1% 0204
2229-7003.005	2229-D	1R54	0001-0209.011	R-MODUL SIL SMD	8X100K 5% 0W06
2229-7003.005	2229-D	1R55	0000-7647.411	R-METALL-MMELF	100K 1% 0204
2229-7003.005	2229-D	1R56	0000-7697.429	R-METALL-MMELF HF-	14R7 1% 0204
2229-7003.005	2229-D	1R57	0000-7646.946	R-METALL-MMELF	1K 1% 0204
2229-7003.005	2229-D	1R58	0000-7646.946	R-METALL-MMELF	1K 1% 0204
2229-7003.005	2229-D	1R59	0000-7668.665	R-METALL-MMELF	5K11 1% 0204
2229-7003.005	2229-D	1R60	0000-7646.946	R-METALL-MMELF	1K 1% 0204
2229-7003.005	2229-D	1S1	0000-7693.119	S-DUAL-IN-LINE	2 100 AU WIPP-
2229-7003.005	2229-D	1U1	0001-0221.853	TRANS SI N MOS DUAL	SI9955DY SO 8
2229-7003.005	2229-D	1U2	0001-0239.162	IC-SCHALTREGLER	MAX641AESA SO 8
2229-7003.005	2229-D	1U3	0001-0238.189	IC-CMOS	LTC1044CS8 SO 8
2229-7003.005	2229-D	1U4	0001-0237.038	IC-DUAL CHOPPER FETOPAMP	LTC1051CS SOL 16
2229-7003.005	2229-D	1U5	0000-7650.194	IC-HCMOS	74HC4052T SO 16
2229-7003.005	2229-D	1U6	0001-0236.806	IC-KOMPARATOR DUAL	LT1017IS8 SO 8
2229-7003.005	2229-D	1U7	0001-0236.851	IC-SPGS.-REFERENZ	MAX872ESA SO 8
2229-7003.005	2229-D	1U8	0001-0236.848	IC-A/D-WANDLER	MAX132EWG SO 24
2229-7003.005	2229-D	1U9	0001-0236.987	IC-CMOS	MAX7232BFIQ PLC 44
2229-7003.005	2229-D	1U10	0000-7671.885	IC-CMOS	80C535NT3 PLC 68
2229-7003.005	2229-D	1U11	2229-9201.009	IC-GATE-ARRAY	OLS-10-GA SO 28
2229-7003.005	2229-D	1U12	0000-7700.251	IC-HCMOS	74HC573ADW SO 20
2229-7003.005	2229-D	1U13	0001-0206.519	IC-CMOS	24C02S8I SO 8
2229-7003.005	2229-D	1U15	0001-0238.202	IC-CMOS	HM62256ALFPI-15T SO 28
2229-7003.005	2229-D	1U16	0000-7696.365	IC-CMOS	4013BD SO 14

OLP-10, SERIES W ...					
PLATINE	LP-INDEX	TEILNR	SACHNUMMER	BENENNUNG	BEZEICHNUNG-1
PC-BOARD	MARKING	ITEM-NO	PART-NUMBER	DESCRIPTION	MARKING
2229-7003.005	2229-D	1U17	0001-0205.772	IC-SPGS.-REGLER	LM317LD SO 8
2229-7003.005	2229-D	1Y1	3004-9702.009	STEUERQUARZ	1.843,200KHZ HC49/U
2229-7003.005	2229-D	1Y2	0000-7522.248	STEUERQUARZ	32,768KHZ

OLS-10

Optical LED Source

BN 2228/03, All Series

Service Manual

Wandel & Goltermann

Communications Test Solutions

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4 omitted

5 omitted

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9 Circuit Description

1 Introduction

1.1 General Notes

Before starting repairs, make sure that you are familiar with the safety measures described in Chapter 2.1.

Chapter 2 contains further, important information about measurement techniques and repair methods.

1.2 Measurement Equipment

Instrument / Designation	Troubleshooting + alignment Chapters 6 - 7	Function check Chapter 8
1 OMS-100 Optical Measurement System with OLP-110 or -120 (800 to 1600 nm)	x	x
1 oscilloscope	x	x
1 frequency counter	x	
1 digital multimeter	x	
1 multimode cable, W&G type K30xx	x	x

2 Important Notes

2.1 Safety notes

Special safety notes for the OLS-8/-10 level generators

You should also read the notes in the Operating Manual.

> ***Caution!***
> LED sources are invisible to the human eye but may nevertheless cause permanent eye injuries.

Before operating the instrument familiarize yourself with the following safety notes and measures:

Safety notes and measures

- Do not look at the source output or at cable ends when the source is on.
- Do not turn on the source until all the optical fiber cables have been connected up properly.
- Under no circumstances should the source output be inspected when the source is on - not even with a microscope.
- Only properly qualified technicians with the appropriate authorization may carry out repairs. They must be familiar with the relevant safety regulations and the associated risks.
- Areas must be designated as such and properly secured as stipulated by the relevant safety regulations (see Section "Warning Signs").
- When optical equipments are being operated, safety regulations to IEC 11825-1, EN 1160825 part 1 (Europe) and 21CFR1040..10 (Japan) must always be observed.

2.2 Anti-static Measures

See Chapter 2.2 in the OLP-10 Service Manual.

2.3 Repair Guidelines for SMD boards

See Chapter 2.3 in the OLP-10 Service Manual.

2.4 Cleaning Instructions

See Chapter 2.4 in the OLP-10 Service Manual.

3 Mechanical Design/Assembly Instructions

3.1 Instrument Codes

You will find the series number on the front panel.

3.2 Assembly Instructions

> ***Note:*** It is essential to familiarize yourself with the notes in Chapter 2 before starting any assembly or disassembly work.

Disassembly

1 Remove black rubber ring <C>.
2 Remove the upper section <A> of the shockproof casing.
3 Remove battery compartment cover.
4 Remove the OLS from the lower section <B> of the shockproof casing.
5 Remove the 4 screws at the rear of the instrument (2 in the battery compartment).
6 Remove the upper section of the casing.

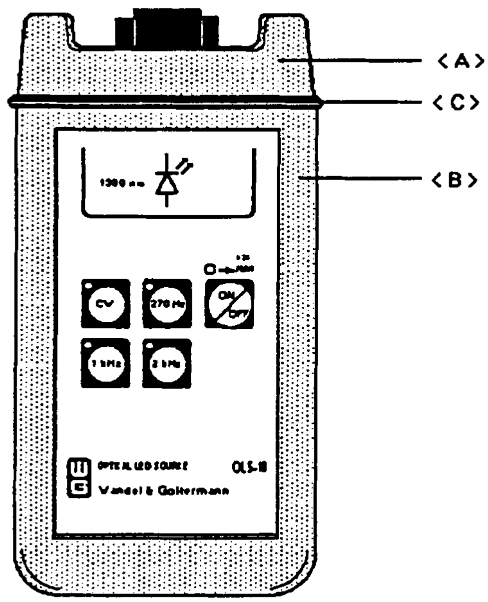


Fig. 3-1 Front view of the OLS

3.3 Jumper Assignment (From Series E)

Jumper	for OLS-8	for OLS-10
BR2	closed	open
BR3	open	closed
BR4	open	closed

4 omitted

5 omitted

6 Fault Localization, Component Level

6.1 General Notes

Caution when performing measurements: the potential of the LED casing is not ground but VBAT.

6.2 Voltage Supply

Nominal battery voltage (points H05 to H06): 2.2 V to 3.5 V.

6.3 On/Off Control

Switching on the instrument

Turn on the instrument with the ON/OFF key.

Point H05:	approx. -0.2 V (first Q3 then U3.2 are turned on)
U1 pin 12:	Low after high edge (RESET)
Signal OFF_OUT/U1 pin 20:	High
Signal CPFF/U1 pin 11:	High

Permanent operation

Hold down the ON/OFF key for >2 s at power-on.

Signal PERM_IN/U1 pin 10:	<1 V after approx. 2 s
U1 pin 21:	Low (=> Q7 disabled)

Switching off the instrument

Turn off the instrument at the ON/OFF key.

Signal CPFF/U1 pin 11:	Low pulse (Q4 on)
Signal OFF_OUT/U1 pin 20:	Low

Reference point: ground connection of C6

6.4 +5 V Supply

Measure the supply voltages. Reference point: Ground connection of C6.

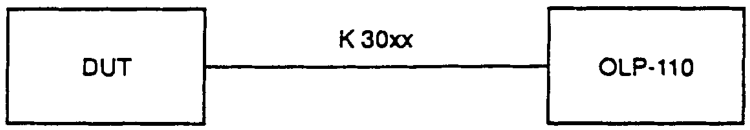
U2 pin 5: +5.00 V 250 mV

6.5 Battery Monitor

The signal BLINK_IN (U2 pin 2) goes from HIGH to LOW if the voltage VBAT < 2.2 V.

7 Alignment Instructions

Test setup



Instrument settings

OLS-8/10: FMOD = CW

OLP-110: ABS, STD, Lambda = see below
FMOD = CW, BW = 2 Hz, AUTORANGE ON
Lambda-FILT = OFF, DISPL = x.xx

Alignment

For OLS-8: Set OLP-110 to 850 nm

For OLS-10: Set OLP-110 to 1300 nm

Adjust R21 so that the send level is -20.00 dBm ± 0.1 dB.

8 Function Check/Confidence Test

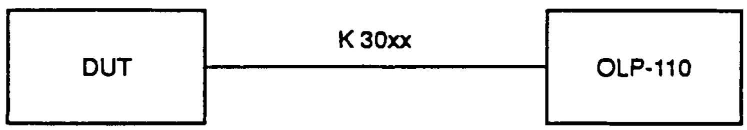
8.1 Introduction

The technical data is specified for certain types of cable. The send level is different for different types of optical cable. The check is based on cable type K30xx and on DIN or FC connectors.

8.2 Preparations

- Ambient conditions: moderate lab environment, 23 °C ± 3 °C
- The optical connectors must be carefully cleaned and checked before the function check is carried out.

8.3 Test setup



Instrument settings

OLS-8/10: FMOD = see below

OLP-110: ABS, STD, Lambda = see below
FMOD = see below, BW = 2 Hz, AUTORANGE ON
Lambda-FILT = OFF, DISPL = x.xx

8.4 Checking the Send Level (CW)

Connecting up the test setup.
Set the OLP-110 to the appropriate wavelength and carry out a check using the following Table.

OLS-8:	850 nm	-20.00 dBm ± 2.5 dB
OLS-10:	1300 nm	-20.00 dBm ± 2.5 dB

8.5 Checking the Modulation

Use the test setup as before and carry out a check using the following Table.

DUT	OLP	Nominal value
AC, 270 Hz	AC, 270 Hz	-20.00 dBm ± 2.5 dB
AC, 1 kHz	AC, 1 kHz	-20.00 dBm ± 2.5 dB
AC, 2 kHz	AC, 2 kHz	-20.00 dBm ± 2.5 dB

9 Circuit Description

Nominal current setting

The nominal current setting comprises the voltage-controlled current source (U4.2/Q6/R25). Diode D2 is the reference.

Modulation

The send diode DS-1 is modulated by Q5. Q5 is driven at the same rate as the modulation frequency by U1 pin 17. Depending on the base potential of Q5, the current flows through Q5 or through DS-1. The current and so the source can be switched on by DS-1.

Keypad controller

The keypad controller U1 is a customized gate array. Four of the five keys are connected to it: CW, 270 Hz, 1 kHz and 2 kHz. The gate array detects which key has been pressed, turns the appropriate LED on and applies the appropriate modulation frequency to output F_OUT.
The keypad controller also controls turn off and turn on, permanent mode and the battery low warning (see Section "Battery Monitoring").

ON/OFF control

The "main switch" of the instrument is formed by the two, parallel MOSFETs U3.1 and U3.2. Q3 is an auxiliary power-on switch.

When the ON/OFF key is pressed, Q3 is turned on, the DC/DC converter U2 receives current and starts up, the 5 V voltage supply builds up and the gate array receives a reset. When a reset is detected, the gate array connects output OFF_OUT (pin17) to high and so turns on U3.1 and U3.2. The instrument is now on.

If the ON/OFF key is held down, capacitor C8 charges via R15 and Q4. From a certain level (ON/OFF pressed > 2 s), the gate array detects PERM_IN low at its input and the instrument goes into the permanent mode. This means: the PERM LED is turned on and the instrument's battery saver facility is disabled.

If the PERM_IN input remains high (ON/OFF pressed < approx. 2 s), the instrument will turn itself off automatically after 20 minutes to save the batteries. The PERM LED does not come on.

Turning off the instrument: if the ON/OFF key (instrument turned on) is pressed, the gate array receives a pulse via Q4 and C9 at input CPFF (U1 pin 11). The OFF_OUT output goes LOW and U3.1 and U3.2 are disabled. The instrument is turned off.

Battery monitor

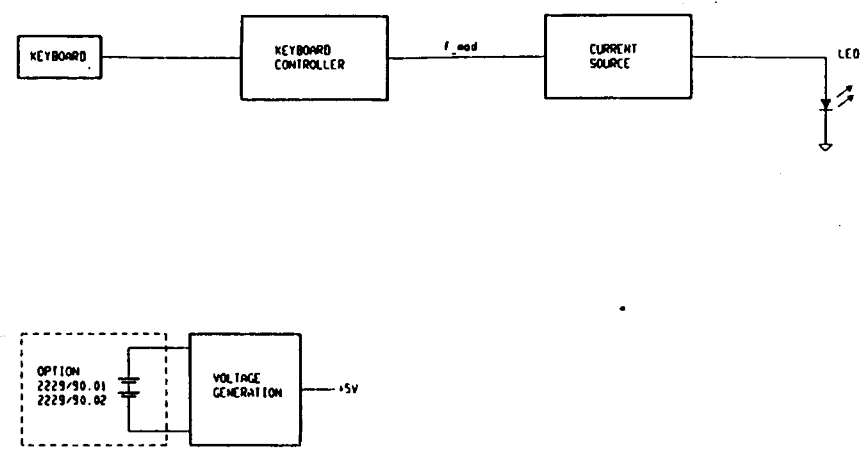
Voltage regulator U2 contains a comparator (U2 pin 1 = input) which acts as a battery monitor. Output U2 pin 2 (BLINK_IN signal) goes low when the battery voltage drops below 2.2 V. As a warning, the gate array causes the active LEDs to flash.

5 V supply

The DC/DC converter U2 will operate from a battery voltage of approx. 2 V and is design to operate up to approx. 3.5 V.

Cutout circuit (from series E)

Comparator U5 acts as a cutout for the OLS-8. If the send diode current exceeds 30 mA, Q5 is turned on and so limits the current through the send diode. In the case of the OLS-10, current limiting of this kind is not necessary and is deactivated (jumper BR4).



Serienanmerkung
Series modifications
Modification de série
1) Serie

*) Abgleichwert
Alignment value
Valeur d'adjustage

Gleichspannungen gegen Masse
All voltage ratings measured with respect to 0V
Toutes les tensions données sont mesurées par rapport à 0V

Bestückungszeichnung siehe Seite
For assembly markings see page
Schéma d'implantation voir page

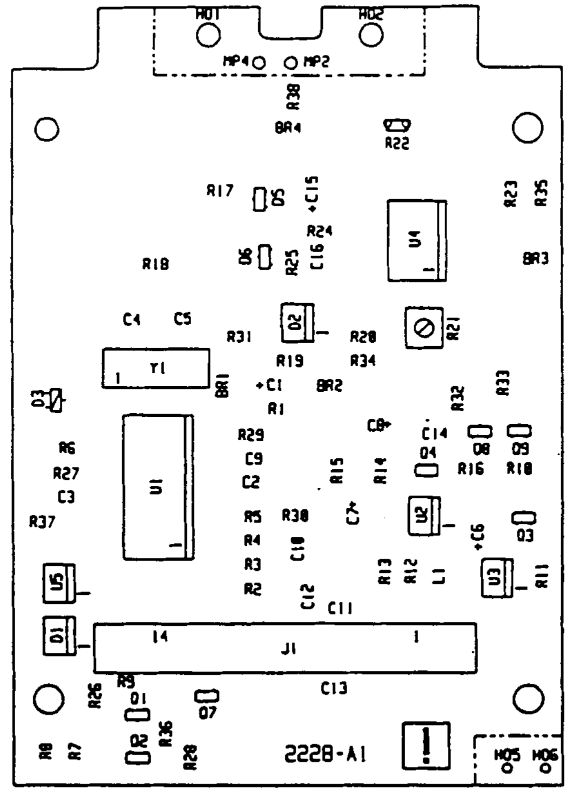
WG PM 2228 Serie A

Blockschaltplan
BLOCK DIAGRAM
Schéma synoptique

2228-7500.013/3

Ausg. (0) 1 Blatt Blatt 1

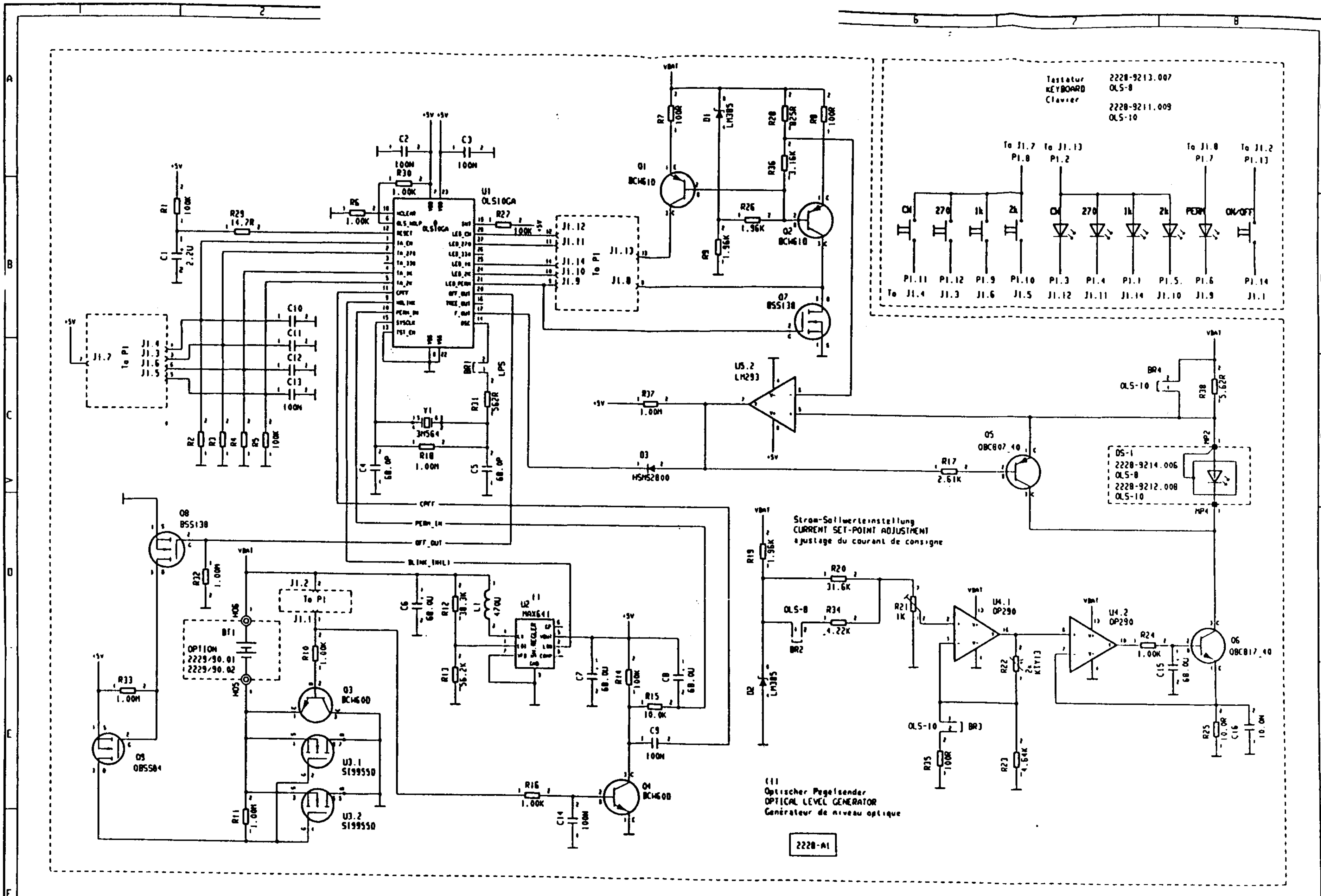
FF



(1)

WSSW
WSrl

Benennung DESIGNATION OLS-10		
Sachnummer PART No. 2228-7000.908 .		Format SIZE 4
LP-Index 2228-A1	CAD	



Serienanmerkung Series modifications Modification de série	1) Serie F...: U2/MAX631

*) Abgleichwert
Alignment value
Valeur d'adjustage

Gleichspannungen gegen Masse
All voltage ratings measured with respect to 0V
Toutes les tensions données sont mesurées par rapport à 0V

Bestueckungszeichnung siehe Seite
For assembly markings see page
Schéma d'implantation voir page } 3-2

BN2228 | Serie F ... | Ausg. 2

Optischer Pegelsender 1310nm
OPTICAL LEVEL GENERATOR
Générateur de niveau optique

(1)

1 Blatt
Blatt 1

2228-7501.038/3

OLS-10, SERIES L ...					
PLATINE	LP-INDEX	TEILNR	SACHNUMMER	BENENNUNG	BEZEICHNUNG-1
PC-BOARD	MARKING	ITEM-NO	PART-NUMBER	DESCRIPTION	MARKING
BOARD-OVERVIEW			2228-7000.911	OLS-10	2228-A2
ITEMS OUT OF BOARD		1H1	2228-9217.003	TASTATUR FOLIEN-	FUER OLS-10/NAVY
ITEMS OUT OF BOARD		1J2	0001-0242.081	BUCHSE KLINKEN-+FED.	2 M LP LT
2228-7000.911	2228-A2	1C1	0000-7681.163	ELKO-TA SINT CHIP	2U2 20% 6V3
2228-7000.911	2228-A2	1C2	0000-7646.535	C-KERAMIK KBFQ	100N 10% 50V
2228-7000.911	2228-A2	1C3	0000-7646.535	C-KERAMIK KBFQ	100N 10% 50V
2228-7000.911	2228-A2	1C4	0000-7610.969	C-KERAMIK KBFQ	68P 2% 50V
2228-7000.911	2228-A2	1C5	0000-7610.969	C-KERAMIK KBFQ	68P 2% 50V
2228-7000.911	2228-A2	1C6	0000-7683.721	ELKO-TA SINT CHIP	68U 20% 6V3
2228-7000.911	2228-A2	1C7	0000-7683.721	ELKO-TA SINT CHIP	68U 20% 6V3
2228-7000.911	2228-A2	1C8	0000-7683.721	ELKO-TA SINT CHIP	68U 20% 6V3
2228-7000.911	2228-A2	1C9	0000-7646.535	C-KERAMIK KBFQ	100N 10% 50V
2228-7000.911	2228-A2	1C10	0000-7646.535	C-KERAMIK KBFQ	100N 10% 50V
2228-7000.911	2228-A2	1C11	0000-7646.535	C-KERAMIK KBFQ	100N 10% 50V
2228-7000.911	2228-A2	1C12	0000-7646.535	C-KERAMIK KBFQ	100N 10% 50V
2228-7000.911	2228-A2	1C13	0000-7646.535	C-KERAMIK KBFQ	100N 10% 50V
2228-7000.911	2228-A2	1C14	0000-7646.535	C-KERAMIK KBFQ	100N 10% 50V
2228-7000.911	2228-A2	1C15	0000-7683.721	ELKO-TA SINT CHIP	68U 20% 6V3
2228-7000.911	2228-A2	1C16	0000-7646.522	C-KERAMIK KBFQ	10N 10% 50V
2228-7000.911	2228-A2	1C17	0000-7699.993	C-KERAMIK KBFQ	1N 2% 50V
2228-7000.911	2228-A2	1C18	0001-0249.673	C-KERAMIK KBFQ	220N 10% 50V
2228-7000.911	2228-A2	1C19	0000-7699.993	C-KERAMIK KBFQ	1N 2% 50V
2228-7000.911	2228-A2	1C20	0001-0249.673	C-KERAMIK KBFQ	220N 10% 50V
2228-7000.911	2228-A2	1C21	0000-7646.535	C-KERAMIK KBFQ	100N 10% 50V
2228-7000.911	2228-A2	1C22	0001-0249.673	C-KERAMIK KBFQ	220N 10% 50V
2228-7000.911	2228-A2	1C23	0000-7646.535	C-KERAMIK KBFQ	100N 10% 50V
2228-7000.911	2228-A2	1D1	0001-0219.551	DIODE SI REFERENZ-	LM385BM-1,2 SO 8
2228-7000.911	2228-A2	1D2	0001-0219.551	DIODE SI REFERENZ-	LM385BM-1,2 SO 8
2228-7000.911	2228-A2	1D3	0000-7672.499	DIODE SI SCHOTTKY-	HSMS-2800-L A0 SOT 23
2228-7000.911	2228-A2	1D4	0000-7655.924	DIODE SI SCHOTTKY-	LL103A M-MELF
2228-7000.911	2228-A2	1D5	0000-7655.924	DIODE SI SCHOTTKY-	LL103A M-MELF
2228-7000.911	2228-A2	1D6	0000-7655.924	DIODE SI SCHOTTKY-	LL103A M-MELF
2228-7000.911	2228-A2	1J1	0001-0237.151	LEISTE FEDER-	14 1 2,54 S1 SN
2228-7000.911	2228-A2	1L1	0000-7694.943	L-FEST SMD	470U 10% LQH4N471K-S
2228-7000.911	2228-A2	1MP1	2228-7000.571	OLS-10 BEARBEITET	02HN3E90FA
2228-7000.911	2228-A2	1Q1	0000-7639.047	TRANS SI PNP	BCW61D BD A SOT 23
2228-7000.911	2228-A2	1Q2	0000-7639.047	TRANS SI PNP	BCW61D BD A SOT 23
2228-7000.911	2228-A2	1Q3	0000-7639.034	TRANS SI NPN	BCW60D AD A SOT 23
2228-7000.911	2228-A2	1Q4	0000-7639.034	TRANS SI NPN	BCW60D AD A SOT 23
2228-7000.911	2228-A2	1Q5	0000-7681.956	TRANS SI PNP	BC807-40 5C A SOT 23
2228-7000.911	2228-A2	1Q6	0000-7681.969	TRANS SI NPN	BC817-40 6C A SOT 23
2228-7000.911	2228-A2	1Q7	0000-7700.400	TRANS SI N DMOS	BSS138 SS B SOT 23
2228-7000.911	2228-A2	1Q8	0000-7700.400	TRANS SI N DMOS	BSS138 SS B SOT 23
2228-7000.911	2228-A2	1Q9	0000-7668.322	TRANS SI P VMOS	BSS84 SP B SOT 23
2228-7000.911	2228-A2	1Q10	0000-7639.034	TRANS SI NPN	BCW60D AD A SOT 23
2228-7000.911	2228-A2	1R1	0000-7647.411	R-METALL-MMELF	100K 1% 0204
2228-7000.911	2228-A2	1R2	0000-7647.411	R-METALL-MMELF	100K 1% 0204
2228-7000.911	2228-A2	1R3	0000-7647.411	R-METALL-MMELF	100K 1% 0204

OLS-10, SERIES L ...					
PLATINE	LP-INDEX	TEILNR	SACHNUMMER	BENENNUNG	BEZEICHNUNG-1
PC-BOARD	MARKING	ITEM-NO	PART-NUMBER	DESCRIPTION	MARKING
2228-7000.911	2228-A2	1R4	0000-7647.411	R-METALL-MMELF	100K 1% 0204
2228-7000.911	2228-A2	1R5	0000-7647.411	R-METALL-MMELF	100K 1% 0204
2228-7000.911	2228-A2	1R6	0000-7646.946	R-METALL-MMELF	1K 1% 0204
2228-7000.911	2228-A2	1R7	0000-7650.893	R-METALL-MMELF HF-	100R 1% 0204
2228-7000.911	2228-A2	1R8	0000-7650.893	R-METALL-MMELF HF-	100R 1% 0204
2228-7000.911	2228-A2	1R9	0000-7647.550	R-METALL-MMELF	1K96 1% 0204
2228-7000.911	2228-A2	1R10	0000-7646.946	R-METALL-MMELF	1K 1% 0204
2228-7000.911	2228-A2	1R11	0000-7654.475	R-METALL-MMELF	1M 1% 0204
2228-7000.911	2228-A2	1R12	0000-7681.105	R-METALL-MMELF	38K3 1% 0204
2228-7000.911	2228-A2	1R13	0000-7647.330	R-METALL-MMELF	56K2 1% 0204
2228-7000.911	2228-A2	1R14	0000-7647.411	R-METALL-MMELF	100K 1% 0204
2228-7000.911	2228-A2	1R15	0000-7647.262	R-METALL-MMELF	10K 1% 0204
2228-7000.911	2228-A2	1R16	0000-7646.946	R-METALL-MMELF	1K 1% 0204
2228-7000.911	2228-A2	1R17	0000-7681.079	R-METALL-MMELF	2K61 1% 0204
2228-7000.911	2228-A2	1R18	0000-7654.475	R-METALL-MMELF	1M 1% 0204
2228-7000.911	2228-A2	1R19	0000-7647.550	R-METALL-MMELF	1K96 1% 0204
2228-7000.911	2228-A2	1R20	0000-7681.095	R-METALL-MMELF	31K6 1% 0204
2228-7000.911	2228-A2	1R21	0001-0214.268	R-TRIM CERMET SMD SQ	1K 20% 0W25 1
2228-7000.911	2228-A2	1R22	0001-0203.169	R-PTC	2K 1%
2228-7000.911	2228-A2	1R23	0000-7665.626	R-METALL-MMELF	4K64 1% 0204
2228-7000.911	2228-A2	1R24	0000-7646.946	R-METALL-MMELF	1K 1% 0204
2228-7000.911	2228-A2	1R25	0000-7668.542	R-METALL-MMELF HF-	10R 1% 0204
2228-7000.911	2228-A2	1R26	0000-7647.550	R-METALL-MMELF	1K96 1% 0204
2228-7000.911	2228-A2	1R27	0000-7647.411	R-METALL-MMELF	100K 1% 0204
2228-7000.911	2228-A2	1R28	0000-7646.878	R-METALL-MMELF	825R 1% 0204
2228-7000.911	2228-A2	1R29	0000-7697.429	R-METALL-MMELF HF-	14R7 1% 0204
2228-7000.911	2228-A2	1R30	0000-7646.946	R-METALL-MMELF	1K 1% 0204
2228-7000.911	2228-A2	1R31	0000-7646.726	R-METALL-MMELF	562R 1% 0204
2228-7000.911	2228-A2	1R32	0000-7654.475	R-METALL-MMELF	1M 1% 0204
2228-7000.911	2228-A2	1R33	0000-7654.475	R-METALL-MMELF	1M 1% 0204
2228-7000.911	2228-A2	1R34	0000-7663.660	R-METALL-MMELF	4K22 1% 0204
2228-7000.911	2228-A2	1R35	0000-7650.893	R-METALL-MMELF HF-	100R 1% 0204
2228-7000.911	2228-A2	1R36	0000-7654.776	R-METALL-MMELF	3K16 1% 0204
2228-7000.911	2228-A2	1R37	0000-7654.475	R-METALL-MMELF	1M 1% 0204
2228-7000.911	2228-A2	1R38	0000-7654.763	R-METALL-MMELF	5R62 1% 0204
2228-7000.911	2228-A2	1R39	0001-0202.762	R-METALL-MMELF HF-	19R6 1% 0204
2228-7000.911	2228-A2	1R40	0000-7663.738	R-METALL-MMELF	ABGLEICHW. 1% 0204
2228-7000.911	2228-A2	1R41	0000-7663.738	R-METALL-MMELF	ABGLEICHW. 1% 0204
2228-7000.911	2228-A2	1R42	0000-7663.738	R-METALL-MMELF	ABGLEICHW. 1% 0204
2228-7000.911	2228-A2	1R43	0000-7646.797	R-METALL-MMELF	750R 1% 0204
2228-7000.911	2228-A2	1R44	0000-7646.946	R-METALL-MMELF	1K 1% 0204
2228-7000.911	2228-A2	1R45	0000-7646.946	R-METALL-MMELF	1K 1% 0204
2228-7000.911	2228-A2	1R46	0000-7647.262	R-METALL-MMELF	10K 1% 0204
2228-7000.911	2228-A2	1R47	0000-7647.440	R-METALL-MMELF	215K 1% 0204
2228-7000.911	2228-A2	1U1	2229-9201.009	IC-GATE-ARRAY	OLS-10-GA SO 28
2228-7000.911	2228-A2	1U2	0001-0239.162	IC-SCHALTREGLER	MAX641AESA SO 8
2228-7000.911	2228-A2	1U3	0001-0221.853	TRANS SI N MOS DUAL	SI9955DY SO 8
2228-7000.911	2228-A2	1U4	0001-0236.796	IC-DUAL OP.-VERST.	OP290GS SOL 16

OLS-10, SERIES L ...					
PLATINE	LP-INDEX	TEILNR	SACHNUMMER	BENENNUNG	BEZEICHNUNG-1
PC-BOARD	MARKING	ITEM-NO	PART-NUMBER	DESCRIPTION	MARKING
2228-7000.911	2228-A2	1U5	0001-0207.822	IC-KOMPARATOR DUAL	LM293D SO 8
2228-7000.911	2228-A2	1U6	0001-0205.772	IC-SPGS.-REGLER	LM317LD SO 8
2228-7000.911	2228-A2	1Y1	2228-9701.001	STEUERQUARZ	3.564.000KHZ HC49/S